

REMARKS

The present application had claims 1, 3-19 pending. Claims 10-16 have been withdrawn from consideration in the present application, but not yet canceled. Applicants have herein amended claims 1 and 6 and have added new claims 20 and 21. Claims 1, 3-9 and 17-21 are now under examination in the present application.

Support for the addition of the term “substrate” to claims 1 and 6 may be found in the specification on page 7, line 30 *et seq.*, and in Figure 1, designation (11). Support for the remaining amendment to claim 1 may be found in the Abstract, lines 7-9. Support for new claims 20 and 21 may be found in the specification and in the originally-filed claims, particularly claims 13 and 14. None of the amendments, nor the addition of claims 20 and 21, introduces new matter to the present disclosure.

In the May 11, 2010 Office Action, the Examiner acknowledged that the claimed invention was not anticipated by Hitomi, *et al.* (US Patent Publication 2002/0019308 A1). The Examiner, however, rejected the pending claims as obvious over Hitomi in view of Xie, *et al.* (US Patent 6,541,150). Applicants respectfully disagree with the Examiner’s position.

Hitomi discloses an electrode for fuel cells that is made by dispersing a composite catalyst in a medium to prepare a paste. This paste is then applied to a porous electro-conductive substrate such as a carbon fiber substrate, and the coating film is dried (see Hitomi, para. [0075]). The resulting electrode has only a thin catalyst layer on the surface of the substrate. This is also clear from Figure 25 of Hitomi wherein it is shown that the gas diffusion layer (layer 263 in Fig. 25) does not contain any catalyst particles and rather, the catalyst particles are present in separate catalyst layer 261. See Hitomi, Figure 25 and paragraph [005].

In contrast to Hitomi, the present invention provides a catalyst-containing gas diffusion layer in which the catalyst particles are distributed uniformly over the entire

volume of the gas diffusion layer, not just on the surface. See the elements of independent claim 1.

Xie is cited to supply the claim elements missing from the teachings of Hitomi – that is, the uniform distribution of catalyst particles throughout the entire volume of the gas diffusion layer. However, the combination of Hitomi and Xie does not fulfill all the claim elements now present in amended claim 1 set forth above.

As amended, claim 1 now requires that the catalyst particles are produced directly in the porous substrate material from suitable precursor compounds by heat treatment.

Neither Hitomi nor Xie, alone or together, disclose or suggest this limitation.

Catalyst impregnation is performed in Xie by making a catalyst paste and soaking/dispersing the paste into the pores of the gas diffusion layer (see Xie, col. 5, lines 24, *et seq.*, or col. 6, line 36, *et seq.*). The catalyst paste is made by mixing carbon-supported Pt catalyst with ionomer and solvent (Xie, col. 6, lines 55-60).

In contrast, the catalyst particles of the claimed invention are uniformly distributed throughout the volume of the gas diffusion layer by forming them *in situ* from precursor compounds. The catalyst particles are prepared by thermal decomposition of precursors (see the specification, page 4, lines 21-24, and page 5, lines 30-35) in the substrate by means of heat treatment (see page 5, lines 14-19).

By this process, the catalyst particles are fixed at the surface (i.e., at the fibres) of the substrate and evenly distributed over the entire volume of the substrate.

Moreover, Xie (like Hitomi) is directed to electrocatalysts (i.e., electrocatalytically active catalysts); whereas the present invention is preferably directed to gas-phase active catalysts (see specification page 3, lines 24-28, and claims 7 and 8). There is no teaching or suggestion in either Hitomi or Xie regarding gas-phase active catalysts.

In summary, the claimed invention as presently set forth in amended claim 1 is patentably distinct from that of Xie, in part because Xie starts from a pre-manufactured

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catalyst and uses a catalyst paste. The catalyst containing gas diffusion layer of amended claim 1 is manufactured in a totally different way. This difference leads to improved performance versus the prior art as explained on page 3, lines 24-28 of the specification.

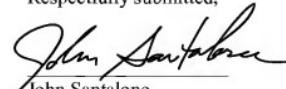
The remaining pending claims of the subject application depend from, and contain all the limitations of, independent claim 1. Accordingly, these claims are distinguishable from the Hitomi and Xie references based on the same reasons presented above for claim 1.

In light of the foregoing remarks and claim amendments, Applicants respectfully request withdrawal of the rejections set forth in the May 11, 2010 Office Action and solicit allowance of the present application.

No fee is believed due in connection with the filing of the present amendment, other than the fee for the requested three-month extension of time. If any additional fees are due, or an overpayment has been made, please charge, or credit, our Deposit Account No. 11-0171 for such sum.

If the Examiner has any questions regarding the present application, the Examiner is cordially invited to contact Applicants' attorney at the number provided below.

Respectfully submitted,



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